UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION V

DATE: August 7, 2013

SUBJECT: Review of East Troy Ohio Phase III

FROM: David Wilson, Geologist, RRS #4

TO: Shari Kolak, RPM

1) Will the high density data from the HRSC sampling by presented within a 3D geo-contaminant data model such as EVS? If so, preliminary posting existing data sets into vary simple draft models may assist the scoping of the Phase III. For example, by just posting the Phase II/I data by showing the length of the monitoring wells and coloring the length of well screen by the contaminant concentration a powerful 3D understanding of the spatial relationships can be rendered with little effort. The existing water level contour maps can likely be converted into a 3D-surface. The use of a viewer programs such the CTech EVS 4DIM viewer allows anyone to view the 3D models.
2) Has a state/local well log survey of all wells in the area been performed?
3) In future maps, consider including all of the monitoring and city wells on the maps. Gray out wells that are not screened in the depth of the wells shown in the map. Posting contaminant plume over groundwater gradient contours such as the Phase I map is a useful map and should be included in future submittals. However, a groundwater gradient contours map with the measured groundwater elevation posted for each well, should also be provided.
4) On the intermediate/deep sampling map include the measured concentration detected in the city wells
5) Why is there a greater then one foot groundwater elevation at Wells EPA-118S and Troy P. Is this mound persistent over time? If the mound persists, it may indicate a leak in water supply line or other source of water close to these wells, error in surveyed elevation? The groundwater flow gradients are important his location because it can influence the contaminant migration path of the plume.
6) Has a recent comprehensive elevation survey of all well being monitored been completed as a part of the Phase I or Phase II? It appears there are monitoring wells that have been installed by three or four different originations or agencies at different times by different contractors. It is difficult to ensure the required

hundredth of a foot accuracy in groundwater elevations is attained, when there has not been a comprehensive elevation survey.

7) Can we have copies of all water level maps? More frequent water elevation maps six to ten times in a year would be useful. Seasonal changes in groundwater flow gradients should be investigated. It looks like P17 was not pumping in the Feb 25, 2013 nor pumping on the April 26-27, 2012 water level maps. The histories of the rates and times of pumping should be collected for all of the city wells and noted in the submittals. Changes in groundwater flow gradients due to changes in configurations of pumping wells should also be investigated
8) The most current well head protection zone analysis for the City of Troy should be reviewed. Relevant geo-hydraulic information on the aquifer should be included in the RI/FS.
9) It appears that Table 2 "GROUNDWATER POTENTIAL VERTICAL GRADIENTS" has calculated the difference in groundwater elevations instead of determining the vertical hydraulic gradient. In order to determine vertical gradients you need to divide the difference in elevation by the vertical separation of the well screens. The length of the screen can also be a factor. A Vertical Gradient Calculator is available on the EPA On-line Tools for Site Assessment Calculation Web page http://www.epa.gov/athens/learn2model/part-two/onsite/vgradient.html
10) Even with considering the comment above, the area of maximum downward vertical gradient is located at the south-western toe of the greater than 100 ug/L shallow contaminant plume. The maximum downward gradient zone is also located across the river from the City Well P-17. The downward gradient may be induced by the pumping of the five City water supply wells. City Well P-17 is recently starting to show contamination. This connection needs to be investigated both hydraulically and chemically. A line of VAS samples should be taken at approximate down gradient toe of the >100 ug/L plume. If possible, the probable location where the plume (following the mapped groundwater gradient) turns more eastward towards the river, should be targeted for VAS. The historic groundwater levels should be evaluated to select the optimal location. If contaminant concentrations are much greater than expected in this location, an additional line of VAS sampling closer to the river may be needed.
11) Including the actual rates of groundwater extraction for each city pumping wells at the time of taking the measurements into the groundwater gradient/potentiometric map may produce more accurate flow maps and better forecasts of contaminant transport directions. Karanovic and Tonkin describe a groundwater gradient mapping-based method, developed by combining universal kriging (kriging with a trend) with analytical expressions that describe the

response of the potentiometric surface to pumped wells or other hydraulic stresses. This method can also be used to estimate the capture zone of the city well field.

12) It is recommended that there should be quarterly monitoring for groundwater wells throughout RI/FS, ROD and RDRA time periods? This recommendation is due to the close proximity between the contaminant plume and the city well field. In this dynamic geologic buried channel environment there can be rapid changes in the contaminant migration.